

DATASHEET

# UJ3D1220K2

## 20A -1200V SiC Schottky Diode

Rev. B, April 2020

### Description

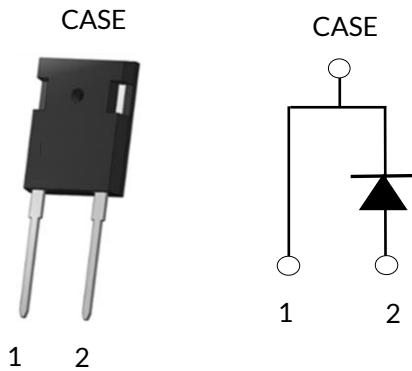
UnitedSiC offers the 3<sup>rd</sup> generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175°C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

### Features

- ◆ Maximum operating temperature of 175°C
- ◆ Easy paralleling
- ◆ Extremely fast switching not dependent on temperature
- ◆ No reverse or forward recovery
- ◆ Enhanced surge current capability, MPS structure
- ◆ 100% UIS tested
- ◆ AEC-Q101 qualified

### Typical applications

- ◆ Power converters
- ◆ Industrial motor drives
- ◆ Switch mode power supplies
- ◆ Power factor correction modules



Part Number	Package	Marking
UJ3D1220K2	TO-247-2L	UJ3D1220K2



## Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
DC blocking voltage	$V_R$		1200	V
Repetitive peak reverse voltage, $T_J=25^\circ\text{C}$	$V_{RRM}$		1200	V
Surge peak reverse voltage	$V_{RSM}$		1200	V
Maximum DC forward current	$I_F$	$T_C = 135^\circ\text{C}$	20	A
Non-repetitive forward surge current sine halfwave	$I_{FSM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	190	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	180	
Repetitive forward surge current sine halfwave, $D=0.1$	$I_{FRM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	71.9	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	40.9	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$	1300	A
		$T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$	1300	
$i^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	181	$\text{A}^2\text{s}$
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	162	
Power dissipation	$P_{tot}$	$T_C = 25^\circ\text{C}$	205	W
		$T_C = 135^\circ\text{C}$	55	
Maximum junction temperature	$T_{J,max}$		175	$^\circ\text{C}$
Operating and storage temperature	$T_J, T_{STG}$		-55 to 175	$^\circ\text{C}$
Soldering temperatures, wavesoldering only allowed at leads	$T_{sold}$	1.6mm from case for 10s	260	$^\circ\text{C}$

## Thermal Characteristics

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction-to-case	$R_{\theta JC}$			0.56	0.73	$^\circ\text{C}/\text{W}$

## Electrical Characteristics ( $T_J = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	$V_F$	$I_F = 20\text{A}, T_J = 25^\circ\text{C}$	-	1.52	1.7	V
		$I_F = 20\text{A}, T_J = 150^\circ\text{C}$	-	2.15		
		$I_F = 20\text{A}, T_J = 175^\circ\text{C}$	-	2.25		
Reverse current	$I_R$	$V_R = 1200\text{V}, T_J = 25^\circ\text{C}$	-	18	190	$\mu\text{A}$
		$V_R = 1200\text{V}, T_J = 175^\circ\text{C}$	-	500		
Total capacitive charge <sup>(1)</sup>	$Q_C$	$V_R = 800\text{V}$		83		nC
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$		810		pF
		$V_R = 400\text{V}, f = 1\text{MHz}$		75		
		$V_R = 800\text{V}, f = 1\text{MHz}$		69		
Capacitance stored energy	$E_C$	$V_R = 800\text{V}$		24.5		$\mu\text{J}$

(1)  $Q_C$  is independent on  $T_J$ ,  $di_F/dt$ , and  $I_F$  as shown in the application note USCi\_AN0011.

## Typical Performance Diagrams

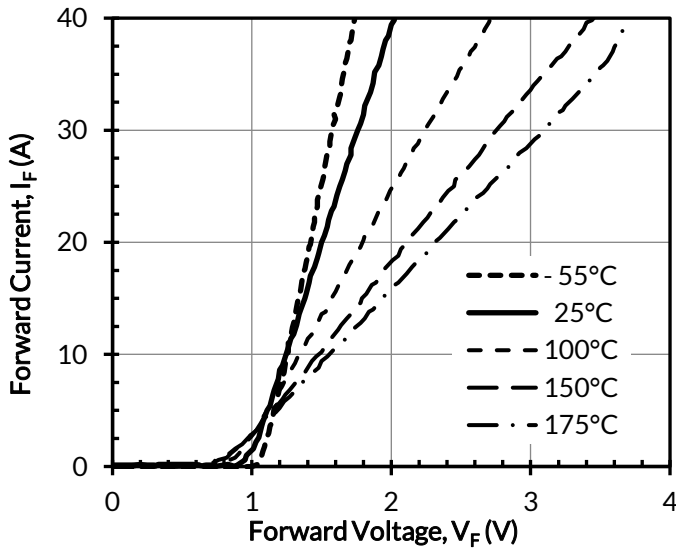


Figure 1. Typical forward characteristics

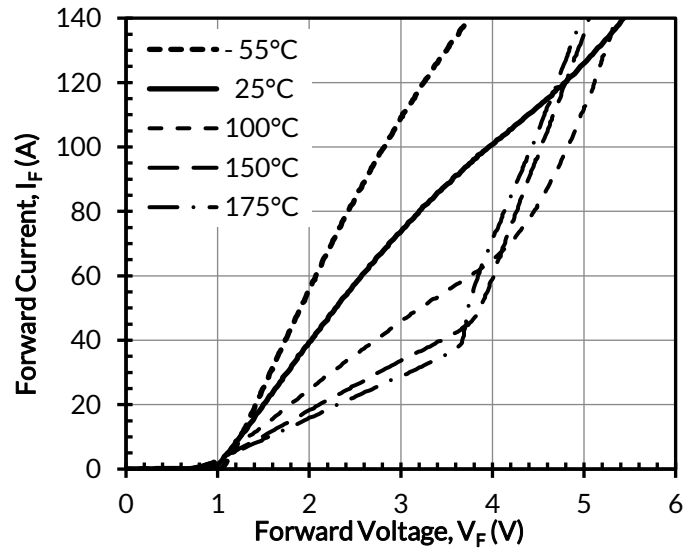


Figure 2. Typical forward characteristics in surge current

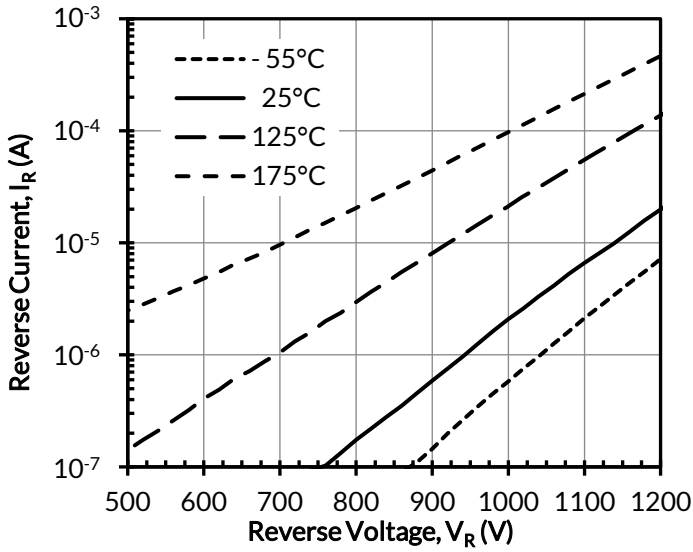


Figure 3. Typical reverse characteristics

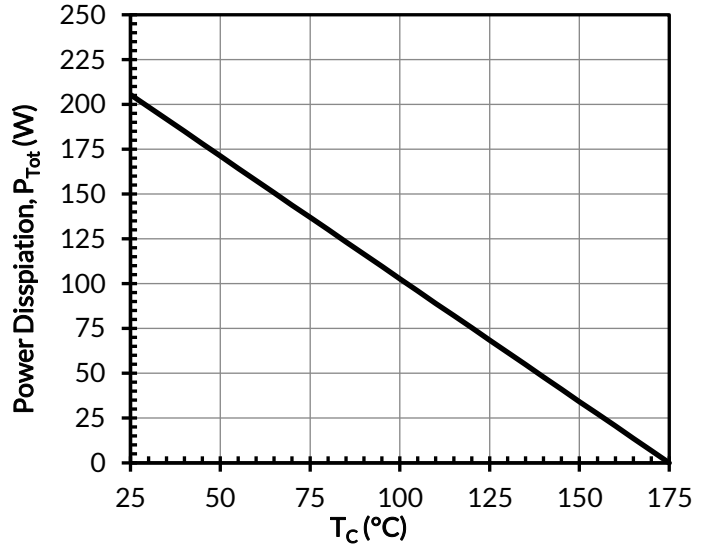


Figure 4. Power dissipation

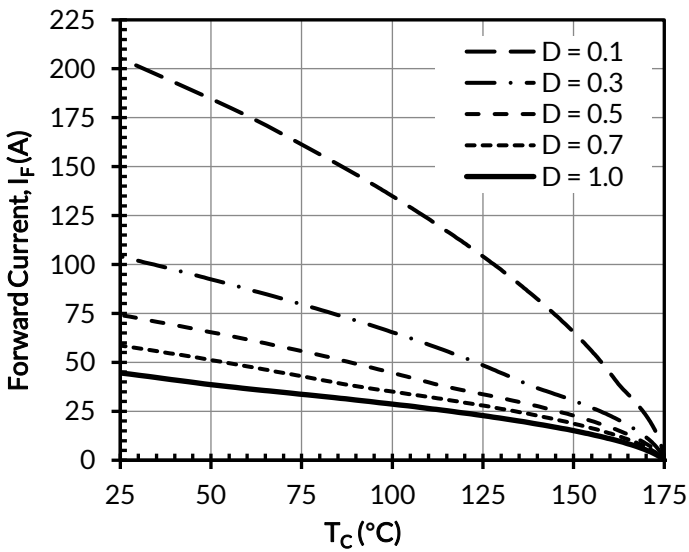


Figure 5. Diode forward current

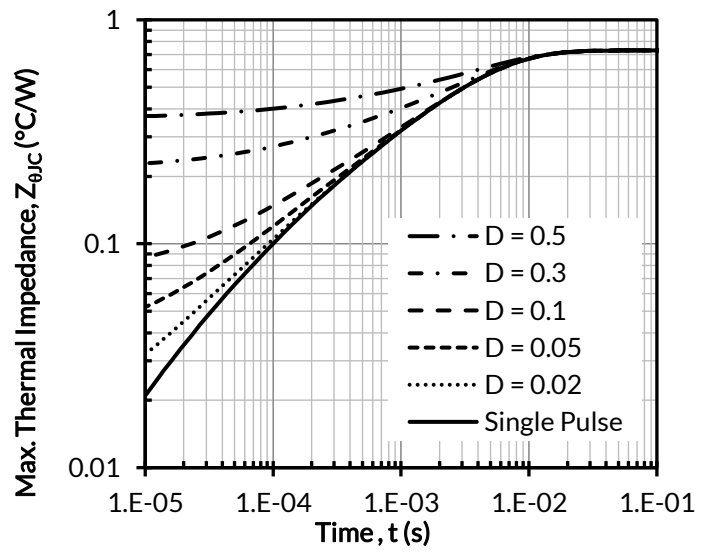


Figure 6. Maximum transient thermal impedance

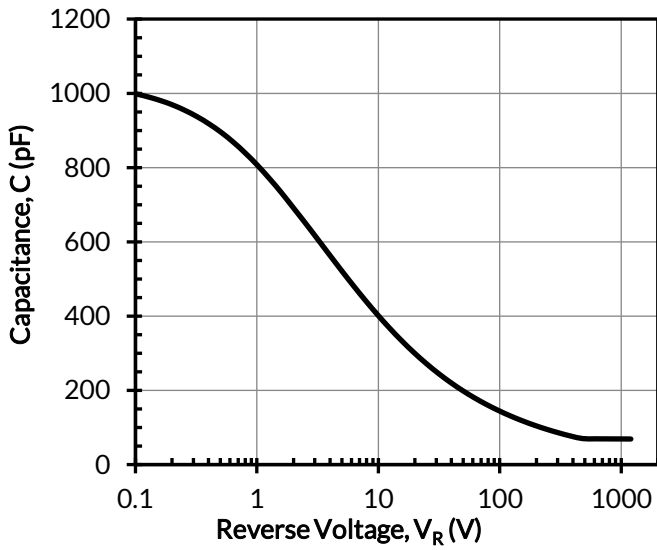


Figure 7. Capacitance vs. reverse voltage at 1MHz

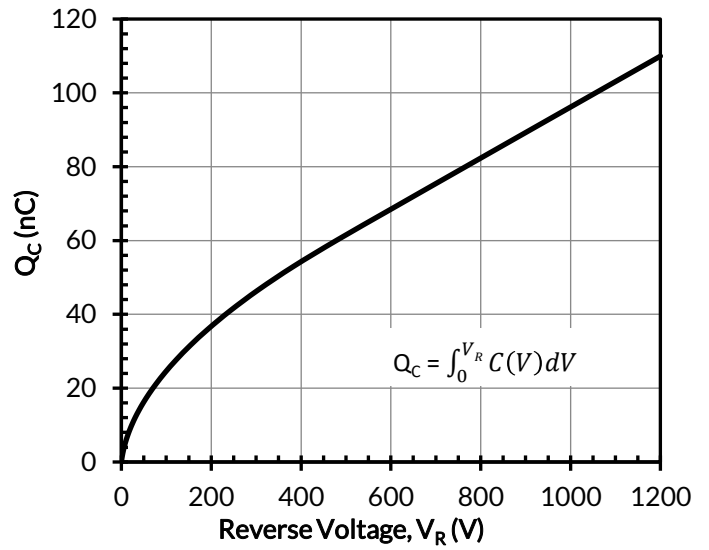


Figure 8. Typical capacitive charge vs. reverse voltage

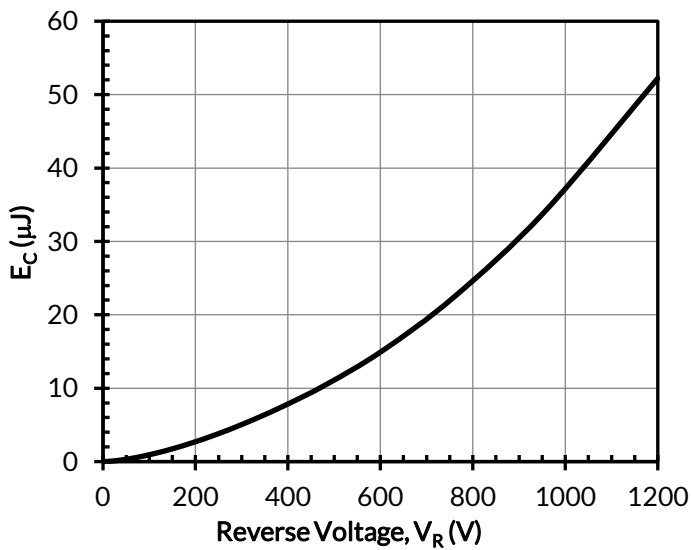


Figure 9. Typical capacitance stored energy vs. reverse voltage

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